MATH 3420: Differential Equations II (TENTATIVE)

TIME AND PLACE: MTWR 10:00 - 11:50 am - LANG 104
PROFESSOR: Santiago I. Betelú
OFFICE: GAB 316, e-mail: betelu@unt.edu
OFFICE HOURS: MTWR 7:30-8:00 and 12:00-13:30
TEXT: 'Applied Partial Differential Equations', Richard Haberman, 5th ed.

Grading: Grades are based on two midterm exams (25 points each), homework and special projects (25 points) and a cumulative final exam (50 points). The lowest of the midterm grades or homework is dropped, so that the maximum score is 100. To earn an A you need 90 points, 80 for a B, 70 for a C and 60 for a D.
Homework: They will be assigned each class and due the following class. The homework must be clear and show all intermediate steps. Check with the solutions at the end of the chapter, if you don't get them come to my office for help.
Exams: Midterm exams will be given in class on Jul 18 and Aug 1 on the usual class time. The final exam is scheduled on Fri Aug 9 on the same classroom (these dates may change). Calculators, electronic devices or notes are not allowed during exams.
Disabilities: Students with certified disabilities must provide the instructor with appropriate documentation from the Dean of Students Office.
Cheating will not be tolerated and anyone caught will receive an F.

SCHEDULE

Week	Summary
1	Introduction to PDEs. Separation of variables. General vs. particular solutions. The Heat Equation. Dimensionless problems.
1	Boundary and initial conditions. Equilibrium temperature distribution. Linearity and superposition.
1	Fourier series. Orthogonality of functions. Eigenfunction expansions. The initial value problem for the Heat Equation. Non homogeneous problems.
2	Laplace's Equation. Boundary conditions and well posed problems. Applications.
2	The Wave Equation. Vibrating strings. Solutions of the initial value problem.
2	Boundary value problems and eigenvalues. Sturm Liouville theorem. Generalized Fourier series.
3	Nonhomogeneous vibrating strings. Mixed boundary conditions.
3	Higher dimensional PDEs. Vibrating membranes. Bessel's functions.
3	Problems in cylinders. Application: magnetron. Spherical geometry. Legendre's equation. Irrotational flow of ideal fluids.
4	Fourier Transform. Heat equation in an infinite domain. Delta of Dirac.
4	Similarity solutions. Nonlinear examples. Underground water flow.
4	Traveling waves in general. Method of Characteristics. D'Alambert solution.
4	Nonlinear conservation laws. Shock waves.
5	Approximate numerical methods. Solving Laplace's equation with conformal mappings. Comprehensive review.
Aug 9	Final Exam 10:00-11:50am